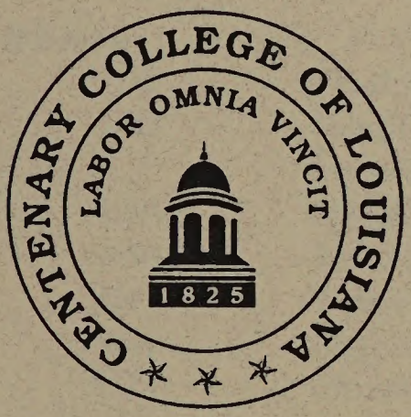
Centenary College
of
Louisiana



Student Research Forum

Friday, April 16, 1999
Kilpatrick Auditorium

CENTENARY COLLEGE
STUDENT RESEARCH FORUM

Sponsored by The Muses and Provost & Dean of the College

	1:00	Opening
Humanities Division		
	1:15	Jennifer Phifer
	1:30	Shelley Ralph
Social Sciences Division		
	1:45	Karianne M. Neu
	2:00	Elizabeth Lagerson, Jeff Maddocks, Jeremiah Stevens, Natalie Thompson
	2:15 - 2:45	**BREAK**
Natural Sciences Division		
	2:45	Chad Ruffin
	3:00	John Thurston
		Valerie Curtis
	3:15	Joseph R. West
	3:30	Miles McDowell
	3:45	Tigger Denison
	4:00	Angelique Lasseigne
	4:15	Christina Ledbetter
Posters		
		Micah Strange
		Chad Ruffin
		Chad Ruffin
		Jamie Stanley

Judges
Dr. Ken Aizawa
Dr. Joyce Johnson
Dr. Jerry Lisantti

I would like to thank the Centenary Muses for their generous financial support which makes this event possible. I would like to thank Mrs. Jeannie Clements for her wonderful and hard work in creating this program. And the last but not the least, I would like to thank all our judges for their hard work and patience.

Yvonne Ilke Yaz
Director

RESEARCH PAPERS

"Esau Eats" and Other Poems: A Reading

JENNIFER K. PHIFER
Department of English, Humanities Division

The original poems that compose this reading explore language in a number of different forms and themes. Though few poems, if any, will demonstrate a regular formal construct, they all do reflect attention to meter, rhythm, and rhyme. They range in topics and characters from an old Texan woman with money up her petticoat to the forests of Lebanon to musings on womanhood to the house that Esau built.

The Victories of Dagny Taggart

SHELLEY RALPH
Department of English, Humanities Division

Feminist critics have paid little attention to Dagny Taggart, the heroine of Ayn Rand's *Atlas Shrugged.* The first goal for my research was to determine the reasons for this. I determined that Dagny Taggart was a character who was not relevant to the goals of the feminist critics of the 1970's. At this time, they were focusing on female characters as victims, and Dagny Taggart is not a victim. The second goal of my research was to read *Atlas Shrugged* with a different feminist perspective. Through this perspective, I focused on the heroic aspects of Dagny Taggart. I determined that she is indeed a character worthy of study and admiration because of her intense strength, her ability to combat traditional gender roles, and her independent quest for her identity.

Prevalence & Gambling-Related Crime Among Adolescents in Louisiana Technical Institutes

LJ JOHNSON, JW WESTPHAL, JA RUSH, L STEVENS, & KM NEU*
Psychology-;Social Science

Objectives: To determine prevalence of disordered gambling behavior, average age of onset of gambling behavior, and co-occurrence of gambling disorders with frequent substance use, within the Louisiana Technical Institute (adolescent prison) population (grades 6th -12th).
Methods: A survey was completed by all adolescent residents (N=1293) of Louisiana Technical Institute populations (grades 6th -12th; 1996-1997 school year).
Results: Lifetime prevalence of gambling was 83%. Past-year prevalence rate of Level 2 problem gambling was 14.9% and of Level 3 pathological gambling behavior was 20.3%. The average age of onset of gambling behavior was 11.7 years. Weekly or more frequent alcohol and/or other illicit drug use occurred in 17.7% of imprisoned adolescents with Levels 2 and 3 gambling disorders.

Conclusions: The study identified four significant factors in Louisiana Technical Institute adolescent populations: (1) Gambling behavior is widespread; (2) gambling experimentation behavior usually begins in 5th grade and begins later than other experimentation behaviors (smoking tobacco 7.8 yrs., marijuana .8.2 yrs., and alcohol 8.1 yrs.) ; (3) disordered gambling is consistently prevalent from 6^{th}-12th grades, and ; (4) although the majority (62.6%) of imprisoned adolescents with gambling disorders (Levels 2 + 3) use alcohol and other illicit drugs regularly (monthly or more frequently), gambling disorders are not limited to those adolescents. Primary prevention of gambling disorders should target 3rd-6th graders, with secondary prevention appropriate for 6th-12th graders.

Retaining Students by Providing Outlets for Expression

ELIZABETH LAGERSEN, *JEFF MADDOCKS, *NATALIE THOMPSON, *JEREMIAH STEVENS, AND DR. MARK FISCH
Department of Sociology, Social Science Division

Retention of students has long been a subject of debate at Centenary. This survey explores the social-psychological theory of alienation and how it relates to student happiness. The working hypothesis is that increased outlets for students to express their opinions about academics and administrative decisions will lead to greater satisfaction and a higher retention rate. Current programs Centenary utilizes to increase retention are compared to other similar colleges. Finally, we propose a new approach to satisfaction surveys on campus, taking into account student opinions of how this data should be gathered.

Metabolic Rate of *Triturus viridiscens* as an Indicator of Water Quality of Various Caddo Parish Water Sources

CHAD RUFFIN AND BETH LEUCK
Department of Biology, Centenary College

The thin, moist skin of the amphibian cutaneous respiratory system allows environmental toxins to easily enter all organ systems by diffusion across the integument directly into the circulatory system. Changes in the metabolic rate of the common newt, *Triturus viridiscens,* was used to evaluate water quality of a variety of Caddo Parish water sources. The metabolic rate of newts exposed to polluted water did increase as compared to control water. The data suggest that higher mortality rates were a result of the additive toxicity from the increased influx of polluted runoff waters into the water source.

Efforts toward the design of a discovery based experiment investigating alcohol dehydration.

JOHN THURSTON*, VALERIE CURTIS, DR. ERNEST BLAKENEY
Department of Chemistry, Science Division

A series of alcohols containing eight carbon atoms with different substitution patterns about the alcohol functionality were synthesized via the Gringnard reaction for potential use in a discovery lab experience investigating alcohol dehydration reactions. To determine their suitability for this laboratory experience, these alcohols were exposed to a variety of reaction conditions that lead to dehydration and the outcomes of these reactions were analyzed using gas chromatography-mass spectroscopy. Analysis revealed that many of these alcohols underwent complicated rearrangements under the dehydration conditions tested. Further work is needed to better define dehydration reaction conditions.

Trace Metal Detection By Laser-Induced Breakdown Spectroscopy.

***JOSEPH R. WEST, JR. and THOMAS M. TICICH, Department of Chemistry, Natural Sciences Division, Centenary College, RANDALL L. VANDER WAL and PAUL A. HOUSEHOLDER, NCMR c/o NASA-Lewis Research Center, Cleveland, OH.**

We have developed an improved laser-induced breakdown spectroscopy (LIBS) technique for analyzing metal ions in solution in which a known volume of sample is deposited on a carbon disk and evaporated to dryness. A focused 1064 nm beam from a ND:YAG laser ablates materials from a 2 mm spot on the disk, which is fastened to a rotatable holder in a cell filled with 76 Torr of argon. At longer delay times, the emission results from atomic and ionic species in the ablated material with minimal interference from the initially-formed plasma or the carbon substrate. We tested a total of 15 different metal ions at a variety of concentrations to assess linearity and detection limits. The latter range from 10 ppb to 25 ppm, which are lower than those observed using LIBS on the solution itself.

Depositional Environment of the James Limestone, Aventura Ranch Field, TX

***MILES MCDOWELL AND DR. MARY BARRETT**
Department of Geology & Geography, Natural Science Division

Limestone cores from wells in Van Zandt County, Texas, Aventura Ranch Field, were studied to determine the depositional environment(s) of the study area. Petrographic analysis was performed on two cores from the Cretaceous-age James Limestone. This section is divided into three units. The lower portion contained little or no fossils and had some shaly areas; it is interpreted as a protected low energy environment. The center portion contained many fossils, reefal material, and ooids. It is interpreted as being from a high-energy environment and from oolitic shoals. The upper portion of the cores showed little signs of fossils and was shaly; it was similar to the lower section and came from a low energy/protected environment. Overall these cores were formed under a shallow sea environment that covered most of Texas and North Louisiana with patch reefs, oolitic shoals, and protected lagoons. This environment can be compared to the modern day Bahamas.

Methods of scoring and monitoring foosball games for viewing and statistical purposes.

*DENISON, S., 1. JOHNSON, J. RODRIGUEZ
Department of Physics, Science Division

We present a new way to monitor foosball games similar to Carnegie Mellon's FR-P-6000 foosball table, but superior to it because our table far surpasses the capability of their project. In particular, our table will not only keep score but also track the movement of the ball during play. The table uses an array of lasers and photo Darlington to create a grid. As the ball breaks the beam, a signal is sent to the server computer. The signal is converted from binary to base ten and then processed to produce a marker on the monitor screen corresponding to the ball position on the table. This graphic display is then updated to the Internet so games can be monitored at remote locations. Statistics consisting of win, loss, and score will be kept on individual players for determining ranking and seating in tournaments.

Efficacy of Sunscreens

*ANGELIQUE LASSEIGNE, JILL KOVALCHICK, DR. JUAN RODRIGUEZ.
Department of Physics, Science Division

This study investigated the efficacy of sunscreens in the protection of the human skin from the sun's dangerous ultraviolet rays. There were three different experiments performed to find the effects of sunscreens. The first experiment was sunscreen absorption spectroscopy, a technique that reveals the amount of light that each sunscreen absorbs at different wavelengths. In this experiment, the sunscreen was applied to a quartz surface. The important wavelength ranges of light that should be blocked by sunscreens are UVA and UVB. The results of the absorption test did not match with the sun protection factors quoted by the products in most cases. In some cases the sun protection factor was much higher than it should have been. The second experiment is sunscreen emissivity 'in response to UV excitation. Here ultraviolet light is irradiated onto the sunscreen and any resulting emission of light is probed with emission spectroscopy. If the sunscreen glows in the ultraviolet then it is not protecting the skin from the ultraviolet rays. When excited with UVC, every product tested, emitted UVA. The third experiment conducted also probed sunscreen absorption, but the product was applied on the epidermis of a mouse. The mouse skin is a representation of the effect that light would have on human skin because of the genetic make-up of mouse skin.

A Desktop PET Scanner

*CHRISTINA LEDBETTER AND JOHN SUNDERLAND
Department of Physics, Science Division

Positron Emission Tomography (PET) is a medical imaging modality that creates cross-sectional (tomographic) images of radionuclide distribution using positron emitters and a PET imaging system. An inexpensive, small scale, fully functional dual detector desktop PET system was built with imaging capabilities of 9mm FWHM. The system uses two stationary, collimated 2x2 NaI(T1) scintillation detectors. The amplified signals

from the detectors are routed through NIM single channel analyzers and a variable window coincidence module set to 100nsec. The TTL coincidence output is sent to a multichannel scaling card. The radionuclide distribution to be imaged is located inside a Lucite phantom which is secured n an automated translation and rotation tables. Image reconstruction is performed using standard filtered back-projection algorithms using code generated in a PV-Wave programming environment. All reconstruction steps are displayed including sinogram creation, stepwise creation of the back-projected image, Fourier filtering, and the final image. Measured sensitivities and resolution of the device is primarily a function of detector collimation and angular and linear sampling distances.

POSTERS

Testing the Effects of Endurance Training on Muscular Function

MICAH STRANGE, BETH LEUCK
Department of Biology, Science Division

Measuring the electrical activity of a muscle indicates the exertion by that muscle during contraction. The purpose of this experiment was to investigate the differences in the electrical activity of their quadriceps and hamstring muscle groups between individuals who are trained and untrained at running. I hypothesized that when running at the same speeds, trained runners will have lower levels of electrical activity in their quadriceps and hamstring muscle groups than will the untrained runners. Two groups, trained men and untrained men, were selected to run at three speeds for a specific duration while the electrical activity of their quadriceps and hamstring muscle groups were measured. The individuals in the trained group (n=6) consisted of individuals whose frequency of running was equal to or greater than five times in two weeks (or $\geq$ 10x per month). The individuals in the untrained group (n=6) ran no more than three times in two weeks (or $\leq$ 6x per month). While running on a motorized treadmill, each individual had electromyogram (EMG) probes attached to the quadriceps and hamstring muscles on their right leg. The EMG probes were attached approximately on or near the origin, insertion, and belly of the tested muscle group and each set of probes was centered around the middle of the muscle group. To accommodate for the high stride frequency of the individual during running, which is near 1.4 strides/s (Anderson, 1994), eight samples were collected per s. Each test was performed at speeds of 5.5, 6.0, and 6.5 mph and each speed was sustained for a minimum of 100 samples (about 12.5 s). Data were collected on a spreadsheet and then queried to find the ten highest peaks and ten lowest troughs for each muscle group at each speed. These peaks and troughs correlate to the maximum and minimum exertion of each muscle at those running speeds. The means of the collected values (quadriceps minimum and maximum and hamstring minimum and maximum) at each speed were calculated and compared by an analysis of variance (ANOVA) test. No grouping of mean electrical activities of trained and untrained individuals (of the same muscle group at the same speeds) yielded results that show significance (p-values>0.05). This data specifically indicate there is no significant difference in muscular exertion (measured as electrical activity) in the quadriceps or hamstring muscle groups between runners who are trained and those who are untrained at speeds between 5.5 and 6.5 mph.

The Effect of Reactive Oxygen Metabolites on the NO-mediated S-Nitrosation of Albumin

CHAD RUFFIN, DAVID JOURD'HEUIL, ALLEN MILES, AND MATTHEW B. GRISHAM
Department of Molecular and Cellular Physiology,
Louisiana State University Medical Center

The NO-dependent S-nitrosation of thiols to generate S-nitrosothiols has been proposed as an important pathway for the metabolism of NO *in vivo.* Although it has been suggested that these S-nitrosated compounds are resistant to decomposition by reactive oxygen metabolites (ROMs), very little information is available regarding the interaction between S-nitrosothiols and ROMS. We found that the superoxide and hydrogen peroxide generator hypoxanthine/xanthine oxidase mediated the decompostion of S-nitroso-albumin, the most abundant nitrosothiol in plasma. The presence of superoxide dismutase but not catalase reversed the effect suggesting that superoxide but not hydrogen peroxide mediated the decomposition of the nitrosothiol. We conclude that superoxide may act as a physiological modulator of S-nitrosation reactions by directly promoting the decomposition of S-nitrosothiols.

The effect of obesity on heart rate, respiratory pressure, and temperature after exercise in companion dogs.

JAMIE STANLEY
Department of Biology, Math and Science Division

Heart rate, respiratory pressure, and body temperature were used as indicators to measure the effect of obesity on the physical performance of companion dogs. There were significant differences between the three categories of thin, average, and obese dogs. The most significant results were between average and obese dogs. Heart rate increases in obese dogs were 15% greater than in average dogs. Respiratory pressure increased 49% more in obese dogs than in average dogs. The average temperature increase of obese dogs was twice that of the average dogs. These results indicate that there is increased stress on the body of an obese dog and thus an increased risk of heart problems or other illnesses.